

Appl. No. 10/711,392
Amdt. dated June 12, 2005
Reply to Office action of April 12, 2005

REMARKS/ARGUMENTS

Claims 1-7 were rejected under 35 U.S.C. 102(b) or 102(e), for reasons of record that can be found on page 3 in the Office action identified above, which is Part of Paper
5 No./Mail Date 20050408.

Applicants believe that none of the prior art records teach a CMP process comprising polishing the top bulk metal layer at a substantial constant removal rate to expose the barrier layer by utilizing a first platen and a first slurry being selective to the barrier layer, as required by claim 1. More is said about this below.

10 Puppe et al. disclose a composition for the CMP of metal and metal/dielectric structures. Puppe et al. teach that the composition contains 7 to 100% by volume of a cationically stabilized silica sol which contains 30% by weight of SiO₂ and the SiO₂ particles of which have a mean particle size of less than 300 nm, with a pH of from 4 to 10, and less than 0.05% by weight of oxidizing agent. Puppe et al. do not teach or expressly
15 suggest that the top bulk metal layer is polished in one single step at a substantial constant removal rate to expose the barrier layer by utilizing a single platen and slurry being selective to the barrier layer.

Miller et al. teach a CMP method including the steps of, see paragraphs [0064], [0065], and FIGS. 10-11, removing an upper portion of copper 1150 using a first platen and
20 copper slurry, then placing the wafer onto a softer platen (second platen) such as IC1020, then removing the remaining copper and a portion of the barrier layer 1130 in two steps using two down forces (2 psi and 1 psi), and then polishing the remaining barrier layer 1180 using the third platen and barrier slurry. Miller et al. do not teach or expressly suggest that the top bulk metal layer is polished in one single step at a substantial constant removal rate to expose
25 the barrier layer by utilizing a single platen and slurry being selective to the barrier layer.

Hau-Riege et al. (see FIGS. 1b-1e) disclose a copper CMP method characterized in that after a recessed copper layer 105 is polished, a metal cap 107 is formed thereon. After the

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formation of the metal cap 107, the metal cap 107 and the barrier layer 106 are polished to
formed a metal capped, damascened copper line. Hau-Riege et al. do not teach or expressly
suggest that the top bulk metal layer is polished in one single step at a *substantial constant*
removal rate to expose the barrier layer by utilizing a single platen and slurry being
5 selective to the barrier layer.

Landers et al. teach a CMP method. See FIGS. 2-3, the metal layer 10 and a portion of
the barrier layer 12 are removed using an alumina-based slurry, then the remaining barrier
layer 12 is removed using a neutral pH silica-based slurry to avoid scratching caused by the
alumina-based slurry. However, Landers et al. do not teach or expressly suggest that the top
10 bulk metal layer is polished at a *substantial constant removal rate* to expose the barrier
layer by utilizing a single platen and slurry being selective to the barrier layer.

Reconsideration of claim 1 is therefore politely requested. As Claims 2-7 are
dependent upon claim 1, they should be allowable if claim 1 is allowed. Reconsideration
of claims 2-7 is therefore politely requested.

15 Claims 1-7 were rejected under 35 U.S.C. 112. The Examiner conceived that the
first slurry is selective to the copper layer, not to the barrier layer. Applicants submit that
the first slurry is selective to the barrier layer, meaning that the first slurry stops on the
barrier layer and does not polish the barrier layer. Similar signification is used in Miller et
al. (see paragraph [0040]). Reconsideration of claims 1-7 is therefore politely requested.

20 Applicants respectfully request that a timely Notice of Allowance be issued in this
case.

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Respectfully submitted,

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- 10 Note: Please leave a message in my voice mail if you need to talk to me. The time in D.C. is 12 hours behind the Taiwan time, i.e. 9 AM in D.C. = 9 PM in Taiwan.